

The Effect of Consultant Related and External Factors on Completion of Water Projects in Kakamega County, Kenya

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Abstract: Inability to complete projects are among the challenges faced in the course of executing construction projects. The most widely used project success criterion is meeting time, quality and cost requirements. The objective of this study was to investigate the effect of consultant related and external factors on completion of water projects in Kakamega County, Kenya. The instrument of data collection was questionnaires. The target population consisted of 104 employees working for two water projects in Mumias and Lugari both in management and lower levels. Simple random sampling was used to select 90 who formed the sample size out of which, 74 respondents returned the questionnaires representing 82% response rate. Analysis of data was done using descriptive and inferential statistics using correlation and regression. Consultant related factors considered included experience, skilled personnel, co-ordination, site supervision and decision making ability and they had a significantly fairly strong positive relationship with project completion ($r = 0.583$, $p < 0.05$). External factors of political interference, industrial action, regulation, taxation and material unavailability in the market had a weak but significant positive relationship ($r = 0.312$, $p < 0.05$) with project completion. The overall regression model gave R^2 of 0.409. This showed that that the variations around the means in consultant related and external factors is about 41%.

Keywords: Kakamega County, consultant related factors, external factors, project cost, project completion time and project quality.

1. INTRODUCTION

The construction industry plays a significant role in socio-economic development as it provides the basis upon which other sectors can grow by constructing the physical facilities required for the production and distribution of goods and services. The most common criteria for measuring project success is based on the triple constraint model; time cost, scope with quality being the central theme. Any change in one of the factors affects the other two. For instance, increase in scope without corresponding increase in time and cost leads to poor quality work or decrease in time without corresponding decrease in scope leads to poor quality if cost remains constant. According to [9], a project is generally considered to be successfully implemented if it comes in on-schedule, comes in on-budget, and achieves basically all the goals originally set for it and is accepted and used by the clients for whom it is intended.

There are many factors which influence successful completion of construction projects which can be grouped into consultant, contractor, client and external factors. This study focused on external factors and consultant related factors. The objective of the study was to evaluate the effect of consultant and client related factors in the completion of water projects in Kenya using Kakamega County as a case study. This would help various actors involved in the construction industry to mitigate disruptions associated with construction projects.

2. CONCEPTUAL FRAMEWORK

A conceptual framework is a representation of the main concepts or variables under study and their presumed relationship with each other. It is a scheme of variables/concepts the researcher will operationalize in order to achieve the research objectives. The conceptual framework used in this study is indicated in Fig. 1

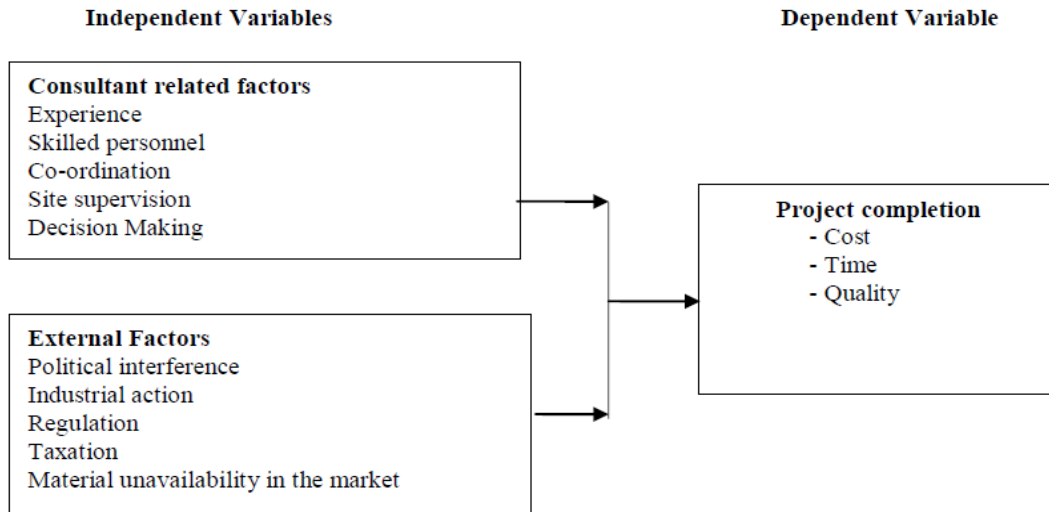


Fig.1: Conceptual framework

3. EMPIRICAL REVIEW

Several studies have been carried out on factors influencing completion of projects in African countries and around the world. A study by [16] on factors responsible for delay in completion time of construction projects in Malaysia were categorized into eight factors i.e. client related, consultant related factors, contractor related factors, material related factors such as quality of material and shortage in material, Labour and equipment related factors ,contract related factors, contract relationship related factors and external factors. In road construction projects in Zambia, [5] found that the major causes of delays, cost escalation and quality shortfalls in road construction projects in Zambia were delayed payments, financial deficiencies on the part of the client or the contractor, contract modifications, economic problems, material procurement problems, changes in design drawings, staffing problems, unavailability of equipment, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labour disputes and strikes.

In Egyptian construction projects, [1] found that completion were hampered by slow delivery of payments, coordination problems and poor communication. Another study by [8] identified the main factors affecting cost and time overrun as inadequate/inefficient equipment, tools and plants; unreliable sources of materials on the local market and site accidents for construction projects in Kuwait. In Libya the main causes of delays were improper planning, lack of effective communication, and shortage of supply of materials i.e. steel, concrete, etc. design errors, slow decision making and financial issues [17] .

A study by [10] found that change orders, financial and other client-related factors are the most significant factors that affected completion of projects in the United Arab Emirates. They identified 42 factors and grouped them into five categories which included contractors, consultants, project managers, clients, financial and other unforeseen factors. Time and cost overrun were the two most important effects of untimely completion of projects, ranked first and second respectively by both consultants and project managers.

Completion time of groundwater projects in Ghana were negatively affected by poor contractor management, monthly payment difficulties from agencies, material procurement, poor technical performances, escalation of material prices and unexpected [2]. In Tanzania, a study by [7] found the main factors that influenced the completion of construction projects were design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done and it therefore recommended that adequate construction budget, timely issuing of information, finalization of design and project management skills should be the main focus of the parties involved in project management.

4. SUMMARY AND CRITIQUE OF EXISTING LITERATURE

Factors influencing completion of projects can be internal and external factors. Internal factors arise from the parties to the contract (e.g. contractor, client, and consultant) while external factors, on the other hand, arise from events beyond the control of the [3]. A study by [14] covered financing, monitoring, contractor's capacity and contract variations as factors influencing project completion time. This only covered one parameter of project success (time), it did not cover other parameters of project success such as time and quality. These are mainly factors within the project. Other factors such as political, regulatory changes, decision making and co-ordination etc. also affect project completion.

Factors affecting completion of housing projects was studied by [6] who covered project management, contractors, consultants and finance and thus it excluded external factors and was also for urban setting and therefore there was need to have projects in rural areas with unique challenges. A study by [15] on road projects investigated the effect of management support, design specifications and contractor capacity on project completion. This covered road projects and concentrated on internal factors while leaving out other factors such as consultant related and external factors. Therefore, it can be concluded that most researchers in Kenya have concentrated on factors within the project [9, 4, 6, 14]. However, some studies have shown that other factors outside the control of contracting parties can influence completion of projects [8, 1, 5, 10]

5. RESEARCH METHODOLOGY

This study adopted a descriptive survey research design which according to [11] determines and reports the way things are or answers questions concerning the current status of the subjects in the study. A case study design was adopted so as to try and bring out deeper insights and better understanding of the issues under study

Simple random sampling and proportional sampling was used to choose the subjects in this study. Simple random sampling was used to determine the overall number to be selected from the target of 104 and proportional sampling was used to allocate the number of those to be sampled from the two water projects. Random sample of 90 people were selected to be respondents in the study. This represented 86% which was above 30% suggested by [11] as the sample size. This sample was proportionally divided between the two water projects where 31 were sampled in Mumias water project and 59 selected randomly to respond in Lugari water project. Questionnaires were administered to all the identified respondents. The questionnaire contained closed ended questions for ease of analysis. The respondents were required to rank the factors influencing completion on a 5-point Likert scale as follows; 1 for strongly disagree, 2- disagree, 3- neutral, 4 – agree and 5 – strongly agree.

Pilot study was done by sampling 12 respondents and the reliability and validity of the questionnaire was measured using Cronbach alpha coefficient. The reliability statistics were as indicated in TABLE 1

TABLE 1 RELIABILITY STATISTICS

| | Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|----------------------------|-------------------------|---|-------------------|
| Consultant related factors | .776 | .775 | 8 |
| External related factors | .719 | .704 | 7 |
| Project completion | .800 | .806 | 9 |

The reliability coefficients were above 0.7 and thus was accepted and used for the study.

6. RESULTS AND DISCUSSION

6.1 Response Rate:

Out of the 90 questionnaires administered, 74 were returned, representing 82% response rate.

6.2 Consultant related factors influencing project completion:

a) Consultant's experience:

The experience of the consultant to undertake project work is important in completion of projects. An experienced consultant can detect errors and mistakes in design documents and also has better co-ordination of project activities and also communication to the various parties (contractor and client and sub- contractor). In response to the question as to

whether the consultant had experience in the project, 45.9% and 24.3% agreed and strongly agreed respectively. This implied that a majority of respondents (about 70%) agreed that the consultant had experience to undertake the work.

Experience of the contract had positive and weak relationship with project cost ($r = 0.227$, $p < 0.05$), project time ($r = 0.311$, $p < 0.05$) and project quality ($r = 0.436$, $p < 0.05$). This can imply that although the consultant was experienced, it had limited effect on project completion parameters.

b) Consultant’s personnel:

In response to the question as to whether the consultant had qualified personnel, 54% and 16% of the respondents agreed and strongly agreed respectively. This meant that majority of the respondents agreed that the consultant had qualified personnel to undertake the project. Correlation analysis showed that qualified personnel of the contractor had significant positive relationship with project completion with $r = 0.573$, $r = 0.616$ and $r = 0.565$, $p < 0.05$ with project cost, quality and time respectively.

c) Consultant’s supervisory ability:

In response to the question as to whether the consultant had good supervisory ability, 35.1 % of respondents agreed while 17.6% strongly agreed. This implied that about half agreed that the consultant had good supervisory ability. This could be explained by the absence of the consultant on site to supervise the project activities where 60.4% of the respondents disagreed that the consultant was on site for project supervision. Correlation analysis indicated that consultant supervisory ability had significant and positive relationship with project completion where $r = 0.685$, $r = 0.654$ and $r = 0.581$, $p < 0.05$ with project cost, quality and time respectively. This therefore meant that experience and quality of workforce notwithstanding, his absence from site affected the project completion parameters. Being a link between the client and contractor, the consultant ought to be on site to ensure that construction activities were executed as per design specifications.

d) Consultant’s co-ordination ability:

This was measured by the ability of the respondent to communicate the correct information to the contractor and client. About 2.7% of the respondents strongly agreed while 40.5% disagreed that the consultant communicated the correct information on time. This therefore meant that majority of the respondents disagreed that the consultant communicated information on timely basis to the client and contractor hence the consultant could not effectively coordinate project activities. Co-ordination ability of the consultant had a fairly strong positive relationship with project quality ($r = 0.649$, $p < 0.05$) and project cost ($r = 0.654$, $p < 0.05$) and weak relationship with project completion time ($r = 0.485$, $p < 0.05$).

e) Consultant’s decision making ability:

This was measured by the ability of the consultant to approve design drawings and sample materials on time.

In response to the question as to whether the consultant approved design drawings and sample materials, 4% strongly disagreed and 50% disagreed that the consultant timely approved design drawings and sample material on time. Decision making ability had moderate positive relationship with client satisfaction with quality ($r = 0.538$, $p < 0.05$), project completion time ($r = 0.463$, $p < 0.05$) and project cost ($r = 0.504$, $p < 0.05$).

The overall correlation of consultant related factors and project completion is indicated in TABLE 2

TABLE 2: CORRELATION OF CONSULTANT RELATED FACTORS AND PROJECT COMPLETION

| | | Consultant Related | Project Completion |
|--------------------|---------------------|--------------------|--------------------|
| Consultant Related | Pearson Correlation | 1 | .583* |
| | Sig. (2-tailed) | | .000 |
| | N | 74 | 74 |

*. Correlation is significant at the 0.05 level (2-tailed)

From TABLE 2, consultant related factors had a significantly strong positive relationship with project completion ($r = 0.583$, $p < 0.05$). The consultant related factors considered in the study were, experience, personnel, supervisory ability, co-ordination ability and decision making ability. This was in agreement with studies by [1] and [5] who found poor co-ordination and poor supervision as the most important factors associated with consultant that influence project completion. The decision making ability of the consultant in terms of approval of design documents and sample materials

to enable the contractor to proceed with construction had significant impact on completion of the project which was consistent with studies by [16] which found delayed approval of design documents as important factor causing delays in construction projects. The main function of a consultant involve acting as a bridge between the client and the contractor and thus the ability to co-ordinate the project functions of the two parties influence the project completion parameters.

6.3 External factors:

a) Political interference in the project:

In response to the question as to whether there was political interference in the project, 55.4% agreed while 23% strongly agreed that there existed political interference on the project. Therefore, it implied that majority of the respondents (88%) agreed that political and local leaders interfered with project. Correlation analysis showed that political interference had weak negative and insignificant relationship with project quality ($r = - 0.020, p > 0.05$), project completion time ($r = - 0.226, p > 0.05$) and project cost ($r = - 0.159, p > 0.05$).

b) Taxation measures by the government:

In response to the question as to whether there was favourable taxation measures, 28.4% strongly disagreed while 54.1% disagreed. Taxation measures by the government had a fairly weak positive relationship with project completion time ($r = 0.457, p < 0.05$) and project cost ($r = 0.442, p < 0.05$) but weak and insignificant relationship with project quality ($r = 0.135, p > 0.05$).

c) Industrial action:

Industrial disputes and employee unrest could affect completion of projects. 46 % of the respondents agreed that there was no industrial action and unrest from the employees involved in the project. Industrial action and unrest had a moderate positive and significant relationship with project completion time ($r = 0.486, p < 0.05$), project cost ($r = 0.535, p < 0.05$) but statistically insignificant with project quality ($r = 0.467, p > 0.05$).

d) Unavailability of materials in the local market:

In response to the question as to whether the contractor had easy access to materials outside the country, 18.9% and 51.4% strongly agreed and agreed respectively. This shows that majority of the respondents disagreed that the contractor has easy access to materials outside the country. Correlation analysis showed fairly weak but significant positive relationship with project cost ($r = 0.462, p < 0.05$). However, it had a weak and insignificant relationship with the other two parameters of completion time ($r = 0.131, p > 0.05$) and quality ($r = 0.048, p > 0.05$).

e) Regulation:

This was measured by the licensing procedures the contractor had to undergo before carrying out the project. Licensing procedures might have influence on project completion time and cost. In response to the question as to whether there was no bureaucratic licensing procedures, 33.8% strongly disagreed while 55.4% agreed. Therefore, majority of respondents (89%) were of the view that there were bureaucratic licensing procedures.

Licensing procedures had moderately positive relationship with project completion time ($r = 0.495, p < 0.05$) and project cost ($r = 0.510, p < 0.05$) but weak and insignificant relationship with quality ($r = 0.179, p > 0.05$).

The overall correlation analysis for external factors and project completion time is indicated in TABLE 3

TABLE 3: CORRELATION OF EXTERNAL FACTORS AND PROJECT COMPLETION

| | | External factors | Project Completion |
|------------------|---------------------|------------------|--------------------|
| External factors | Pearson Correlation | 1 | .312* |
| | Sig. (2-tailed) | | .007 |
| | N | 74 | 74 |

*. Correlation is significant at the 0.05 level (2-tailed)

From TABLE 3, external factors considered in this study (political influence, material unavailability in the market, regulation, industrial action and taxation measures) had a weak positive relationship with project completion ($r = 0.312, p < 0.05$). This concurred with studies by [13] and [12] who found material unavailability in the market and regulation (licensing and taxation measures) as the most important factors that influence project completion. Also, [5] found industrial action as one of the important external factors influencing project completion.

6.4 Regression Analysis:

Regression analysis was done to determine the cause –effect relationship of consultant related and external factors on project completion.

The results are indicated in TABLE 4.

TABLE 4: REGRESSION OF CONSULTANT RELATED AND EXTERNAL FACTORS AND PROJECT COMPLETION

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|-------------------|----------|-------------------|----------------------------|
| 1. | .583 ^a | .340 | .315 | .468 |
| 2. | .312 ^b | .097 | .085 | .581 |
| a, b. Predictors: (Constant), 1. Consultant related 2. External factors | | | | |

From TABLE 4, coefficient of determination, $R^2 = 0.34$ and 0.097 shows that 34 % of the variation in project completion is associated with consultant related factors while 9.7 % of the variation is associated with external factors.

ANOVA analysis for the above relationships showed that both the above variables had significant relationship.

Multiple regression analysis of the two variables and project completion gave $R^2 = 0.409$ which showed about 41% of variations in project completion could be attributed to consultant and external factors while the remaining is attributed to the other factors not considered in this study. The regression coefficients are indicated in TABLE 5

TABLE 5: REGRESSION COEFFICIENTS

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|-----------------------------|------------|---------------------------|--------|------|
| | B | Std. Error | Beta | | |
| 1 (Constant) | -1.303 | .436 | | -2.987 | .004 |
| Consultant | .367 | .089 | .398 | 4.120 | .000 |
| External | .245 | .118 | .167 | 2.070 | .042 |
| a. Dependent Variable: Project Completion | | | | | |

The regression model of the study was of the form

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Where, y = project completion, α = regression coefficient, β = regression coefficient, x_1 = consultant related factors, x_2 = external factors and ε = error term

Ignoring the error term, the equation of the model would be

$$\text{Project Completion} = -1.303 + 0.367 \text{ consultant} + 0.245 \text{ external}$$

This showed that the factors considered in the study had a positive relationship with project completion. When all consultants related and external factors are zero, influence on project completion will be -1.303.

A unit increase in consultant related factors led to a 0.367 increase in project completion while, a unit increase in external factors led to a 0.245 increase in project completion.

7. CONCLUSION AND RECOMMENDATIONS

The study sought to determine the effect of consultant related and external factors on project completion. The consultant related factors considered included experience, skilled personnel, co-ordination, site supervision and decision making ability. These factors had a significantly strong positive relationship with project completion ($r = 0.583$, $p < 0.05$). Regression of consultant related factors gave $R^2 = 0.34$ which showed that 34 % of the variation in project completion is associated with consultant related factors.

External factors studied were political interference, industrial action, regulation, material unavailability in the market and taxation measures. These factors had a weak but significant positive relationship ($r = 0.312$, $p < 0.05$) with project completion. Regression of external factors gave $R^2 = 0.097$ which showed that 9.7 % of the variation in project completion could be associated with these factors.

The overall regression model gave R^2 of 0.409 indicating that the variations around the means in Consultant factor and external factor is about 41 %. The remaining balance could be explained by other variables, which were not examined in this study.

Therefore consultants should be on site to supervise project activities and also communicate effectively any information including variation orders, design documents and sample materials to the client and contractor promptly. Government should enable favourable taxation measures and eliminate bureaucratic licensing procedures to ensure that projects are completed within time and on budget.

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